Report No. 77-1-7a

November 1976
5230

EVALUATION OF SOUTHERN PINE BEETLE INFESTATIONS ON CUMBERLAND GAP NATIONAL HISTORICAL PARK

by

J. H. GHENT and P. J. BARRY

INTRODUCTION

Cumberland Gap National Historical Park is a 20,000 acre tract located where Virginia, Kentucky and Tennessee meet. It is administered by the National Park Service, U.S. Department of the Interior. The Cumberland Gap is a deep notch cut through the Allegheny Mountains providing a natural passage into Kentucky. The area is noted for its natural beauty and a rich historic past.

Park personnel first noticed the current southern pine beetle infestation in the spring of 1975. The infestation is part of a southwide outbreak of the beetle that involves 13 states. Of the 20,219 acres of the Park approximately one quarter is stocked by host susceptable species. The infestation as it appears now is likely to continue in the Park next year.

This evaluation was conducted by Forest Insect and Disease Management to determine the current biological status of the insect and to appraise its probable trend.

METHODS

During early October a 100 percent aerial sketchmap survey[1/] was conducted on the Park. In early November a portion of the spots detected during the aerial survey phase of the evaluation were examined on the ground to verify cause of mortality and determine the level of activity in the infested area.

1/ Detection of Forest Pests in the Southeast. 1970. U.S.D.A., USFS, SA, S&PF, Div. of FPM, Pub. S&PF-7, Atlanta, GA. 51pp.

TECHNICAL INFORMATION

Insect - Southern pine beetle, Dendroctonus frontalis Zimm.

Hosts - Southern pine beetle is a native forest pest that will attack all species of southern yellow pine and occasionally other conifers as well. The species of southern yellow pine most susceptible to attack in the surveyed area include Virginia (Pinus virginiana Mill.), pitch (P. rigida Mill.) and shortleaf (P. echinata).

Type of Damage - Death of the tree is the result of mining in the cambium by the southern pine beetle as it constructs egg galleries. The beetle also introduces blue stain fungi, Ceratocystis spp., which slows down or blocks water conduction in the stem. Individual infested spots may range from a single tree to several thousand trees.

Life Cycle of the Beetle - The adult southern pine beetle is a dark reddish brown to black beetle about 1/8 inch long. The beetles attack trees in masses and construct winding S-shaped egg galleries in the cambium. Eggs deposited along the galleries hatch into whitish, curved, legless grubs that feed in the cambium. When fully developed, the larvae move to the outer bark where they pupate and transform to adults. New adults bore their way to the outside and fly to green trees in the area.

The complete life cycle takes about 30 days during the summer, and as many as four generations may be produced annually in this area.

RESULTS AND DISCUSSION

Results of the evaluation are summarized in Tables 1 and 2. The aerial survey showed infestations are concentrated in the western section of the Park with spots concentrated along Skyland Road. Spot size ranged from 6 to 400 trees (Figure 1).

Table 1: Summary of Aerial Survey Data - Cumberland Gap National Historical Park

Infestation Size (# Trees)									
6-20		21-50		51-100		101+		Total	
Spots	Trees	Spots	Trees	Spots	Trees	Spots	Trees	Spots	Trees
6	63	4	150	1	75	4	1000	15	1288

Since the last survey in August 1975, the number of southern pine beetle spots has decreased from 30 with an average size of 132 trees to 15 spots averaging 86 trees. All spots checked were actively infested. The Park contained an estimated 1378 active trees at the time of the survey.

Although the population has declined since the last survey, the large number of infested trees and the low green to red ratio indicates a high potential for continued pine mortality should environmental conditions remain favorable in the coming year. Much of the host type in the Park is overstocked Virginia pine.

Some of the detected spots are in remote areas; others are located in high use and recreation areas (i.e. along Skyland Road and in the campgrounds) where they detract from the aesthetic value of the Park and create a potential hazard from dead standing trees.2/

Southern pine beetle activity is likely to continue at a high level in 1976. The application of suppression measures depends on the objectives of the Park and is a decision for the Park managers. It is doubtful that total beetle control would be achieved even with intensive control measures due to the remoteness of some spots and immigration of beetles from adjacent lands. However, individual spot infestations can be controlled. High priority should be given to actively infested trees within spots where aesthetic value is damaged, fire potential is increased and public safety is threatened.

Where direct suppression is desirable, three methods are recommended by the U.S. Forest Service.

1. Removal of infested trees by commercial sale. From both economical and environmental aspects this is the most desirable control method. Trees with nearly developed broods (i.e., red and fading topped trees) should be removed first. Contract time limits should insure rapid removal.

2. Piling and burning of infested trees. This involves cutting and thoroughly burning the infested bark.

3. Chemical control of infested trees. Chemical formulation recommended for southern pine beetle control is 1/2 percent Lindane spray. This chemical is currently registered for this use, but permission must first be obtained for its use on National Park Service land.

Advice and assistance concerning the use of any of these methods are available from the U.S. Forest Service, Forest Insect and Disease Management, Asheville, N.C..

2/ Paine, L.A. 1971. Accident Hazard Evaluation and Control Decisions on Forested Recreation Sites. U.S.D.A. For. Serv. Res. Paper PSW-68, Berkley, Calif. 10pp.

Table 2: Summary of southern pine beetle evaluations on the Cumberland Gap National Historical Park, Fall, 1976.

	Ownership Unit
	Cumberland Gap National Historical Park
1. Results compiled from data collected during the aerial phase of the evaluation:	
Survey type	Aerial Sketchmap
Date of aerial survey	October 4, 1976
Percent survey	100%
Total acreage surveyed	20,219
Total acreage of Park Service land	20,219
Susceptible host type acreage of Park Service land	5,000
Total number of spots on Park Service land	15
Spots per M acre of host type Park Service land	3
Average spot size (trees) Park Service land	86
Range of spot sizes (trees) Park Service land	6 to 400
Reds and faders/M acres host type on Park Service land	257
2. Results compiled from data collected during the ground and aerial phases of the evaluation:	
Date of ground phase	November 11, 1976
Infested trees per M acre of host type Park Service land	276
Total number of infested trees on Park Service land	1,378
Total volume of infested trees on Park Service land	124 Mbf
Total number of affected trees on Park Service land	2,794
Total volume of affected trees on Park Service land	207 Mbf
Ratio of green infested to total red and fading trees	1:1.58

Volume - BF - based on Scribner decimal C log rule. Cords converted to bd. ft. based on 500 bd. ft. per cord.

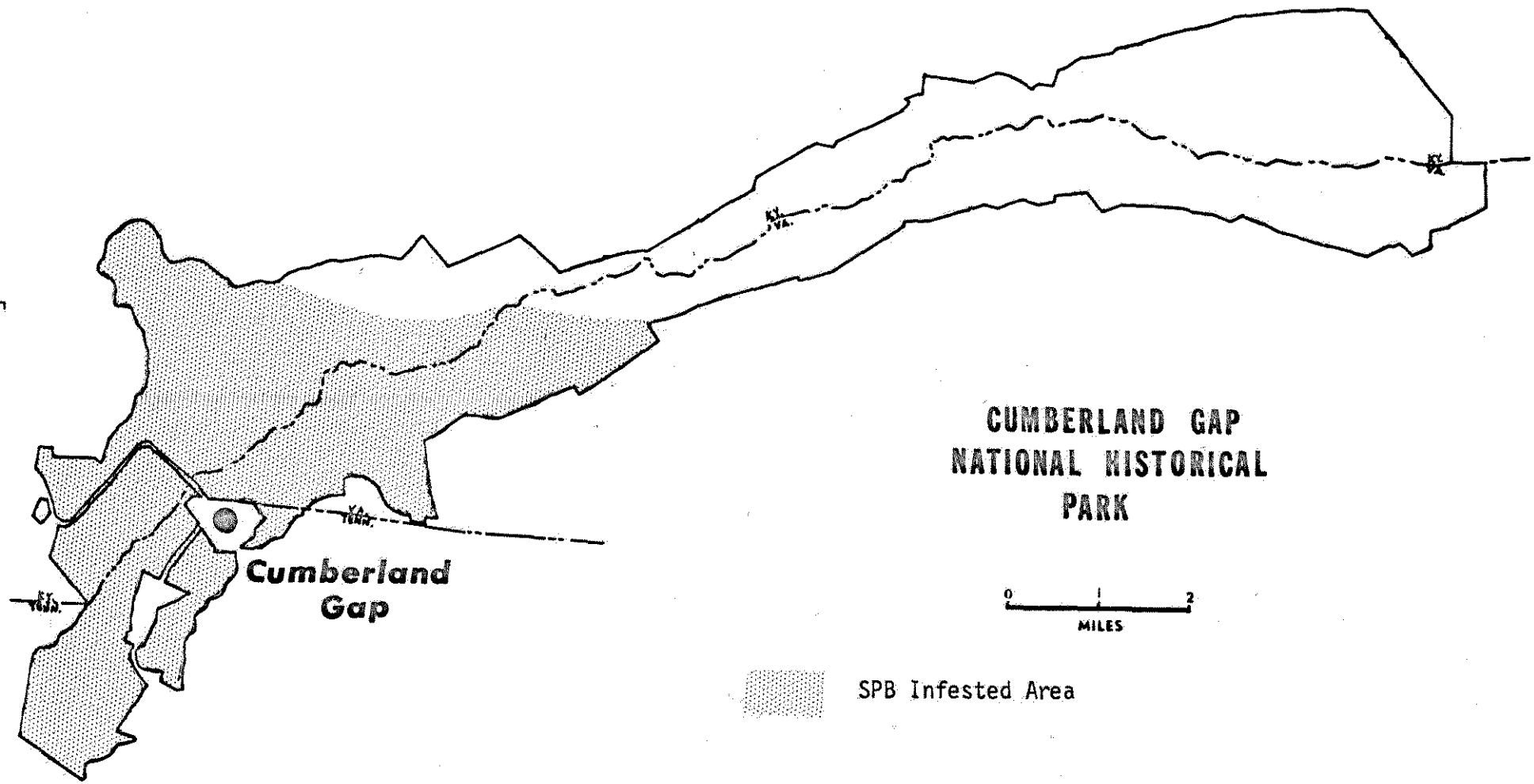

Figure 1: Southern pine beetle infestations on Cumberland Gap National Historical Park, November 1976.

PRECAUTIONARY PESTICIDE USE STATEMENT

Pesticides used improperly can be injurious to man, animals, and plants. Follow the directions and heed all precautions on the labels.

Store pesticides in original containers under lock and key -- out of the reach of children and animals -- away from food and feed.

Apply pesticides so that they do not endanger humans, livestock, crops, beneficial insects, fish, and wildlife. Do not apply pesticides when there is danger of drift, when honey bees or other pollinating insects are visiting plants, or in ways that may contaminate water or leave illegal residues.

Avoid prolonged inhalation of pesticide sprays or dusts; wear protective clothing and equipment if specified on the container.

If your handsbecome contaminated with a pesticide, do not eat or drink until you have washed. In case a pesticide is swallowed or gets in the eyes, follow the first aid treatment given on the label, and get prompt medical attention. If a pesticide is spilled on your skin or clothing, remove clothing immediately and wash skin thoroughly.

Do not clean spray equipment or dump excess spray material near ponds, streams, or wells. Because it is difficult to remove all traces of herbicides from equipment, do not use the same equipment for insecticides or fungicides that you use for herbicides.

Dispose of empty pesticide containers promptly. Have them buried at a sanitary land-fill dump, or crush and bury them in a level, isolated place.

NOTE: Some States have restrictions on the use of certain pesticides. Check your State and local regulations. Also, because registrations of pesticides are under constant review by the U.S. Department of Agriculture, consult your county agricultural agent or State Extension specialist to be sure the intended use is still registered.